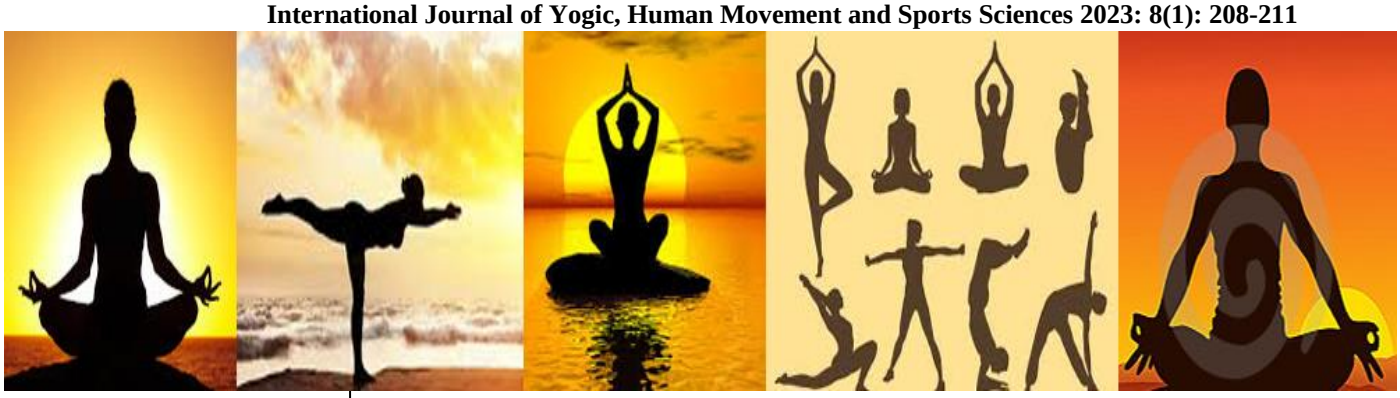
International Journal of Yogic, Human Movement and Sports Sciences 2023: 8(1): 208-211



ISSN: 2456-4419
Impact Factor: (RJIF): 5.18
Yoga 2023; 8(1): 208-211

www.theyogicjournal.com
Received: 10-02-2023
Accepted: 15-03-2023

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The effect of power yoga training programme on cardio-respiratory endurance of obese male

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DOI: https://doi.org/10.22271/yogic.2023.v8.i1c.1537

Abstract
In the light of obesity epidemic, the main objective of this study was to determine the impact of 8 weeks of power yoga intervention on cardio-respiratory endurance i.e. VO_{2max} in obese male. For this purpose, cross sectional study design study was conducted which includes n = 24 obese male subjects' age range between 18 to 28 years between control (n = 12) and experimental groups (n = 12) subjects by using the purposive sampling technique. Further, rockport one mile treadmill walk test was used to assess the cardio-respiratory endurance (i.e., relative maximum oxygen consumption) and the test score was measured in $mL.kg^{-1}.min^{-1}$ rounded off 0.01 $mL.kg^{-1}.min^{-1}$ by using VO2max $^{mL.kg\text{-}1.min\text{-}1}$ formula. The subjects belonging to experimental group were exposed 8 weeks power yoga training programme for 3 days in a week and control group were not expose to any yoga training intervention. Descriptive statistics was used to describe the status of obese male subjects on cardio-respiratory endurance i.e. VO_{2max} variables with the help of groups. For analysing difference between the groups the analysis of co-variance and post-hoc test (LSD) were applied and level of significance was set at the 0.05 level.Findings of the study concludes that power yoga training intervention improves health related physical fitness variable i.e. cardio-respiratory endurance (Vo_{2max}) in obese male.

Keywords: Power, yoga, cardio-respiratory, endurance and obese

Introduction
In today's contemporary and competitive society, the challenge of sparing time for physical activities poses a significant issue. Nevertheless, everyone aspires to maintain an ideal physique. The importance of regular exercise in our daily lives is widely acknowledged. Further, Deuster and Silverman (2013) [7] stated that regular exercise or physical activity persuade positive physiological and psychological effects, protect against the possible consequences of stressful events, and prevent numerous chronic diseases, making physical fitness one avenue towards resilience. Previous researches suggested that regular physical activity have significant impact on health related physical fitness (Hambrecht *et al*., 2000; Pettman *et al*., 2009; Laughlin *et al*., 2012; Egan and Zierath 2013; Vega *et al*., 2017; Conn *et al*., 2014; Stanford and Goodyear, 2014; Ashor *et al*., 2015; Platt *et al*., 2015; Slentz et.al., 2016; Kivimaki *et al*., 2017; Che and Li, 2017; Nystoriak and Bhatnagar, 2018) [11, 20, 15, 9, 29, 6, 13, 5, 19]. Further, Garber *et al*. (2011) [31] also reported that exercise has numerous benefits for most adults, including improved cardiovascular health, reduced risk of diseases, weight loss, insulin sensitivity, glycaemic control, obesity prevention, and overall well-being. Furthermore, obesity increases risks of cardiovascular disease, type 2 diabetes, certain cancers, and death (Lamon *et al*., 1996; Brown *et al*., 2000; Wilson *et al*., 2002; Van Gaal *et al*., 2006; Guh *et al*., 2009) [14, 4, 30, 27, 10]. Moreover, Moore, *et al*. (2017) [18] reported that obesity rates rise, comorbidities like type-2 diabetes and CVD increase.
Additionally, Pollock, *et al*. (1995) [22]; and Siddiqui, *et al*. (2010) [23] reported that regular exercise, including cardiorespiratory, resistance, flexibility, and neuro-motor activities, is essential for maintaining physical fitness and health. However, Haskell, *et al*. (2007) [12]; Minder, *et al*. (2014) [17]; and Dogra, *et al*. (2022) [8] recommended that moderate-intensity aerobic activity for 30 minutes or 20 minutes per week for healthy adults aged from 18 to 65

years. Moreover, Angevaren, *et al*. (2008) [1] also highlighted that aerobic physical activities improve cardiorespiratory fitness, which is beneficial for cognitive function in healthy older adults.

In-addition, yoga improves body-mind harmony by carefully activating and releasing muscles in a coordinated manner. Regular yoga practice is a great addition to other fitness regimens like weight training, cycling, and running. Although, yoga has various forms to perform all the aspects of yoga which serve their own root purpose but this new age generation prefers fitness regimens like weight training, cycling, and running. Further, among all the available forms of yoga, yoga professionals coined a new concept of power yoga with the potential to replicate a demanding full-body workout while concurrently fostering mental composure and attentiveness through more dynamic moves that maintain a steady rhythm. Furthermore, Power Yoga has become increasingly popular as more people are looking for a fitness-focused yoga practice instead of the meditative, gentler poses that they were used to. Moreover, to assess the effect of power yoga on cardio-respiratory endurance researcher among obese male researcher opted this research.

Purpose

The purpose of the present study was to investigate the effectiveness of 8 weeks of prescribed power yoga training programme on cardio-respiratory endurance i.e. VO_{2max} of obese male.

Hypotheses

It was hypothesized that the 8 weeks of prescribed power yoga training programme will have a significant improvement on cardio-respiratory endurance i.e. VO_{2max}.

Methodology

Research Design: The study used a Cross sectional study design to compare the effect of 8 weeks of prescribed power yoga training programme among control and experimental groups on cardio-respiratory endurance i.e. VO_{2max} of obese male.

Selection Of Subjects

A total of 24 obese male resident of Banaras Hindu University Campus, Varanasi, (UP) having a age range between 18 to 28 years were selected by using the purposive sampling technique as the subject for the study. Further, the subjects were further divided into two equated groups and out of which 12 obese selected subjects were acted as experimental group and remaining 12 obese subjects were acted as control group respectively.

Inclusion Criteria

- Obese male,
- 18-25 years,
- Resident of Banaras Hindu University Campus, Varanasi, (UP)

Exclusion Criteria

- Other than obese male,
- Less than 18 years and above 25 years
- Outside resident of Banaras Hindu University Campus, Varanasi, (UP)

Selection of Variables

Dependent Variables: Cardio-respiratory endurance i.e. VO_{2max}

Independent Variables: 8 weeks of prescribed power yoga training programme

Selection of Tests and Criterion Measures

The Rockport One Mile Treadmill Walk Test was used to assess the cardio-respiratory endurance (i.e., Relative Maximum Oxygen Consumption). Further, the test score was measured in $mL.kg^{-1}.min^{-1}$ rounded off 0.01 $mL.kg^{-1}.min^{-1}$ by using VO2max $^{mL.kg-1.min-1}$ Formula.

Administration of Training Programme

The subjects belonging to the control group were not expose to any yoga training programme throughout 8 weeks respectively. But, they was undergoing through their regular daily routine schedule within their lifestyle. In contrast to this, prescribe yoga training programme program as developed by the researcher was implement to the experimental group - A for a period of 8 weeks for 3 days in a week with active rest of 2 days at the end of every week. The intensity, load and volumes was changing in 3rd, 5th 7th, 9th and 11th weeks respectively. The duration of the training was remain 30 minutes a day excluding 5 minutes of dynamic warming up and 5 minutes of cooling down.

Collection of Data

The data of selected 24 obese male resident of Banaras Hindu University Campus, Varanasi (UP) subjects was collected by the research scholar in Yoga and Meditation Hall of Department of Physical Education. Further, the initial data on selected variables i.e. cardio-respiratory endurance (VO_{2max}) of each subject was collected prior to the treatment program and the subjects were further examined after the treatment and considered final data of this research.

Statistical Analysis

Descriptive statistics was used to describe the status of obese male resident of Banaras Hindu University Campus, Varanasi (UP) on cardio-respiratory endurance i.e. VO_{2max} variables with the help of groups. For analysing difference between experimental and control groups, analysis of co-variance and post-hoc test was applied. Further, the level of significance was set at the 0.05 level.

Table 1: Analysis of Experimental and Control Group on Health Related Physical Fitness Variables VO_{2Max} among BHU Resident

Group	Treatment	Mean ± SD	Degree of Freedom		F value	P Value
Experimental Group	Pre Test	53.72±7.15	Contrast	Error		
	Post Test	57.21±9.37	1	21	7.54	0.01
Control Group	Pre Test	48.25±6.58				
	Post Test	46.13±8.75				

N= 12 (Each group)

*Significant at 0.05 level

Table 1 exhibit the Mean and Standard Deviation of pre-test and post-test of cardio-respiratory endurance i.e. VO_{2max} among experimental and control group. Where the mean and standard deviation of pre-test (experimental group) was 53.72±7.15. Further, the mean and standard deviation of post-test (experimental group) was 57.21±9.37. Furthermore, mean and standard deviation of pre-test (control group) was 48.25±6.58. Moreover, the mean and standard deviation of post-test (control group) was 46.13±8.75. Additionally, the analysis of co-variance on selected variable cardio-respiratory endurance (VO_{2Max}) in table 1 indicate the significant difference on post-test among experimental and control group as the obtained P value (0.01) is less than 0.05 (F= 7.54, p<0.05) at 0.05 level of confidence. Further, the graphical representation of experimental and control group on cardio-respiratory endurance (VO_{2Max}) among BHU resident obese male are shown in figure no. 1. Furthermore, to find the exact location of difference where F-Ratio is significant pair wise mean comparison (Post-Hoc) was done by using least significant difference test (LSD). Data pertaining to this has been presented in table-1.

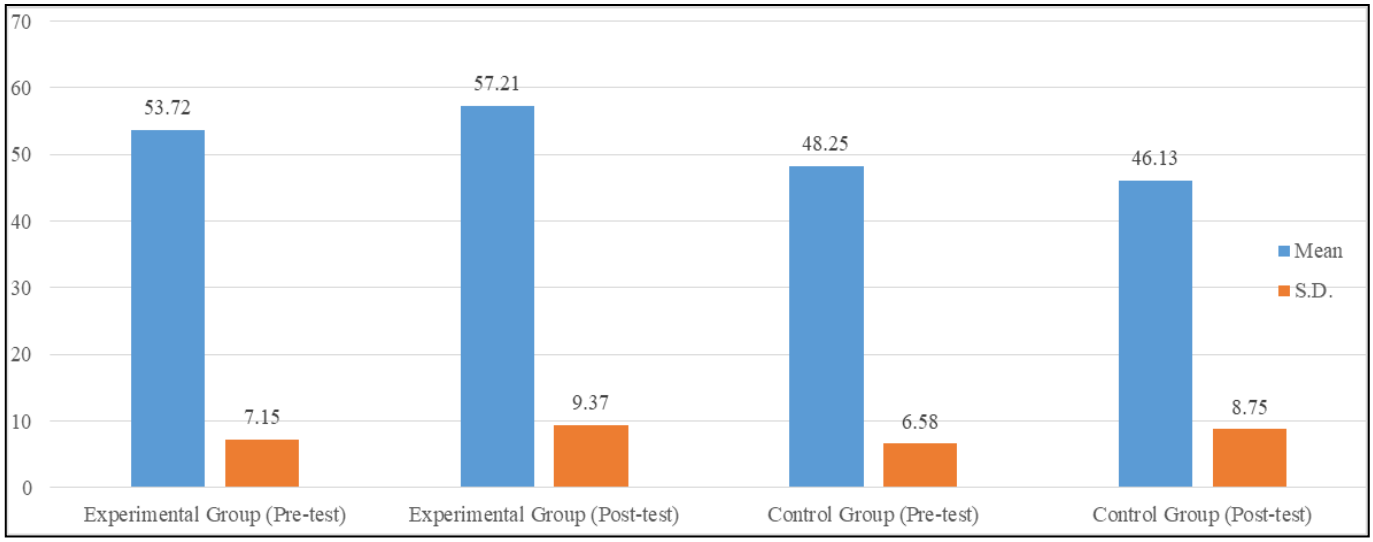

Fig 1: The Graphical Representation of Mean and Standard Deviation of Experimental and Control Group on VO_{2Max} among BHU Resident Obese Male

Table 2: Post-Hoc (LSD) on Experimental and Control Group on Health Related Physical Fitness Variables VO_{2Max} among BHU Resident

Dependent Variable	Group	Group	Mean Difference	Std. Error	Sig.
VO_{2Max}	Experimental	Control	4.45*	1.62	0.01

*significant at 0.05 level

The table-2 exhibits the pair-wise mean comparison through post-hoc test (LSD) for post-test of health related physical fitness variable VO_{2Max} among experimental and control group. The sig-values denotes that the mean of control group is less than the experimental group cardio-respiratory endurance (VO_{2Max}) at the level of significance 0.05. Further, on the basis of the table 2, this has been interpreted that the experimental post treatment group BHU resident has higher VO_{2Max} than the control group BHU resident.

Discussion of Findings

The study was conducted to assess the effectiveness of 8 weeks prescribed power yoga training programme on cardio-respiratory endurance (VO_{2Max}) among experimental and control group Banaras Hindu University Varanasi (UP) resident obese male. Further, the descriptive statistics of tale 1.0 reveals that the experimental post-test group have higher mean value than the control group along with their graphical representation in figure 1.0. Furthermore, analysis of co-variance revealed a significant effect of prescribed power yoga training programme on the BHU resident obese male of experimental group in comparison to control group at 0.05 level of confidence. Moreover, the post-hoc analysis cardio-respiratory endurance (VO_{2Max}) from table no. 1, at 0.05 level of significance shows that 8 weeks of prescribed power yoga training programme have significant positive impact on cardio-respiratory endurance (VO_{2Max}). Additionally, this significant impact of 8 weeks prescribed power yoga training programme is occurred due to the fact that the power yoga is the fusion of explosive movements in yoga. Further, power yoga is a anaerobic activity in which yogic asana are performed with insufficient recovery. Due to this anaerobic nature activity the significant differences were occurred in cardio-respiratory endurance (Vo_{2max}). Furthermore, similar result from previous researches validated these finding. Flores (2015) founded that 6 weeks yoga training programme twice a week for 45 minutes can improve the Vo_{2max} significantly among the 19-25 years old population. Moreover, Balasubramanian and Pansare (1991) [3] and Sinha and Sinha (2014) also found the significant improvement in Vo_{2max} after a 6 week yoga training programme. Likewise, Van Puymbroeck *et al*. (2007) [28] founded that short-term yoga type exercise program influenced multiple health-related aspects of physical fitness. Whereas, previous studies (cross-sectional and interventional studies) reported that the regular practice of HY is not associated with improvements in cardiorespiratory fitness.

Conclusion

The findings of the study shows the significant effect of prescribed 8 week power yoga training programme of the selected health related physical fitness variable i.e. cardio-respiratory endurance (Vo_{2max}). Further, on the basis of the results and findings of the study it was concluded that 8 week power yoga training programme can improve the cardio-respiratory endurance (Vo_{2max}).

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